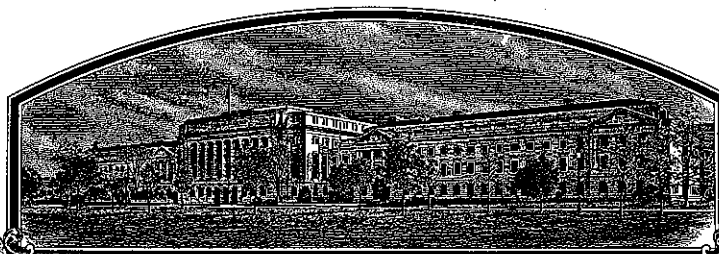


No.

200800160



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

NSH Research Foundation

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TIME THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE REQUIREMENTS OF THE PLANT VARIETY PROTECTION ACT FOR THE GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

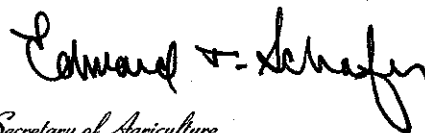
BARLEY

'Rawson'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this sixteenth day of July, in the year two thousand and eight.

Attest:


Commissioner
Plant Variety Protection Office


Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER NDSU Research Foundation		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME ND 19119-2		3. VARIETY NAME RAWSON	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) c/o Executive Director 1735 NDSU Research Park Dr. Fargo, ND 58105-5002		5. TELEPHONE (include area code) 701-231-8931		6. FAX (include area code) 701-231-6661	
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) NDSU Research Foundation 501(c)(3) Corp		8. IF INCORPORATED, GIVE STATE OF INCORPORATION North Dakota		9. DATE OF INCORPORATION May 1989	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Richard D. Horsley Department of Plant Sciences North Dakota State University; PO Box 5051 Fargo, ND 58105-5051 Dale Zetocha NDSU Research Foundation 1735 NDSU Research Park Drive; PO Box 5002 Fargo, ND 58105-5002				<p>FOR OFFICIAL USE ONLY</p> <p>PVPO NUMBER #200800160</p> <p>FILING DATE MARCH 12, 2008</p> <p>FILING AND EXAMINATION FEES: \$ 4,382.00 DATE 3/12/08 CERTIFICATION FEE: \$ 768.00 DATE 6/19/08</p>	
11. TELEPHONE (Include area code) (701) 231-8142		12. FAX (Include area code) (701) 231-6661		13. E-MAIL richard.horsley@ndsu.edu dzetocha@ndsuf.org	
14. CROP KIND (Common Name) Barley		16. FAMILY NAME (Botanical) Poaceae		18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
15. GENUS AND SPECIES NAME OF CROP Hordeum vulgare		17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.	
19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)				20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)	
a <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f <input checked="" type="checkbox"/> Exhibit F. Declaration Regarding Deposit g <input checked="" type="checkbox"/> Voucher Sample (3,000 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) h <input checked="" type="checkbox"/> Filing and Examination Fee (\$4,382), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)				<input checked="" type="checkbox"/> YES (If "yes", answer items 21 and 22 below) <input type="checkbox"/> NO (If "no", go to item 23) <input type="checkbox"/> UNDECIDED	
23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)				21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input checked="" type="checkbox"/> FOUNDATION <input checked="" type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED	
25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.				22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)					
SIGNATURE OF OWNER Dale Zetocha		SIGNATURE OF OWNER			
NAME (Please print or type) Dale Zetocha		NAME (Please print or type)			
CAPACITY OR TITLE Executive Director		DATE 3/4/08		CAPACITY OR TITLE DATE	

GENERAL INSTRUCTIONS: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E, F; (3) for a tuber reproduced variety, verification that a viable (*in the sense that it will reproduce an entire plant*) tissue culture will be deposited and maintained in an approved public repository; and (4) payment by credit card or check drawn on a U.S. bank for \$4,382 (\$518 filing fee and \$3,864 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice).

NEW: With the application for a seed reproduced variety **or by direct deposit soon after filing**, the applicant must provide at least 3,000 viable untreated seeds of the variety *per se*, and for a hybrid variety at least 3,000 untreated seeds of each line necessary to **reproduce** the variety. Partial applications will be held in the PVPO for not more than 90 days; then returned to the applicant as un-filed. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a payment by credit card or check payable to "Treasurer of the United States" in the amount of \$768 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

Plant Variety Protection Office

Telephone: (301) 504-5518

FAX: (301) 504-5291

General E-mail: PVP@mail.usda.gov

Homepage: <http://www.ams.usda.gov/science/pvpo/PVPIndex.htm>

SPECIFIC INSTRUCTIONS:

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and **provide evidence** that the permanent name of the application variety (even if it is a parental, inbred line) has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: U.S. Department of Agriculture, Agricultural Marketing Service, Livestock and Seed Programs, **Seed Regulatory and Testing Branch**, 801 Summit Crossing Place, Suite C, Gastonia, North Carolina 28054-2193 Telephone: (704) 810-8870. <http://www.ams.usda.gov/lsg/seed.htm>.

ITEM

- 19a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) evidence of uniformity and stability; and (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
- (1) identify these varieties and state all differences objectively;
 - (2) attach replicated statistical data for characters expressed numerically and demonstrate that these are clear differences; and
 - (3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
20. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

23. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.) 'Rawson' was first evaluated under a material transfer agreement in Canada, dated April 9, 2003, in USA, dated October 10, 2005, and in Germany, dated February 22, 2006, for evaluation and crossing only. No seed sales allowed. First seed sale out of the ND Crop Improvement & Seed Association was on April 20, 2007.

24. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

'Robust' barley is a component of this variety and received PVP protection in the USA - Certificate No. 8400011 on March 29, 1985.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

EXHIBIT A – ORIGIN AND BREEDING HISTORY**‘RAWSON’**

Spring 1998

- Original cross made at North Dakota State University (NDSU) greenhouse.
- Pedigree = ND15403-3/ND15368//ND16453
- ND16453 = ND13162-2/Logan sib//Mejorana
- ND13162-2 = ND7015//ND7534/Bowman/3/ND8763/Bowman
- ND7015 = Domen//Zephyr/Bonanza/3/ND2685/Manker//Hector
- ND2685 = Klages//Fergus/Nordic
- ND7534 = Fairfield//ND4883/CM 72
- ND4883 = Klages/ND1351
- ND1351 = H316/NDB137//Bonanza
- H316 = Unknown pedigree
- NDB 137 = BR 5755-3/Dickson
- BR 5755-3 = Breeding line from Brandon, Manitoba, Canada of unknown pedigree
- ND8763 = Harrington//ND5692/Robust
- ND5692 = ND2679/7118-702-10
- ND2679 = Klages//Fergus/Nordic
- ND15403-3 = Logan sib/ND13297
- ND13297 = Harrington//ND4758/3/Bowman/4/ND5835/5/ND7819/Bowman/6/AC Oxbow
- ND4758 = Klages//Vanguard/ND1351
- ND5835 = Pauline/Karl
- ND7819 = Klages/ND3103//ND2678-7/5/Karl/4/Vanguard 2*/3/ND1351
- ND3103 = Bonanza//ND1133/Beacon
- ND1133 = H316/NDB 130
- NDB 130 = Traill // Kindred / CI 7117-77 /3/ Trophy
- ND2678-7 = Klages//Fergus/Nordic
- ND15368 = ND13083/ND13100
- ND13083 = ND7819/Bowman/3/ND3715/ND4064//ND7085
- ND3715 = NDB 130//ND1133/Conquest
- ND4064 = Coho//Kristina/Bonanza
- ND7085 = ND1244/ND2678//Hector/3/Multum/ND1351//Karl
- ND1244 = H316/NDB 130
- H316 = Barbless *2/ Chevron // Olli /6/ Wis Pedigree // Oderbrucker /3/ Korsbyg *2/4/ Chevron /5/ Chevron / Trebi /7/2* Jotun /8/ Trophy
- ND2678 = Klages//Fergus/Nordic
- ND13100 = CIho 9214/3/Bowman sib//Mazurka/ND5698/4/ND8763/Bowman
- ND5698 = ND2679/7118-702-10//Fairfield
- 7118-702-10 = Betzes//CIho

5791/2*Parkland/3/Betzes/Pirolina/4/Akka/5/Centennial

- Summer 1998 - F₁ plants grown on NDSU research land.
- Winter 1998-99 - F₂ plants grown in off-season nursery near Christchurch, New Zealand.
- F₂ population is C2-98-160.
- Selection of F₂ plants was based on maturity and plant height.

- Summer 1999 - F₃ head rows grown on NDSU research land.
- Individual F₃ families were selected. Selection of families was based on maturity, plant height, and straw strength.
- Within each family, three spikes were randomly selected from different plants. Two spikes were sent to the off-season nursery near Yuma, Arizona and the third spike was stored as remnant seed in case of a crop failure at the winter nursery.
- After selection of individual spikes, the remainder of each family was harvested.

- Winter 1999-2000 - F₄ head rows are grown at the off-season nursery near Yuma, Arizona for seed increase.
- Grain from harvested F₃ head rows were evaluated for potential malting quality by the Department of Cereal Science (CS), NDSU. Parameters evaluated were barley grain protein, kernel assortment, kernel color, and barley diastatic power.

- Spring 2000 - Based on data from CS, selected F₄ head rows C2-98-160-13-1 is individually harvested.
- C2-98-160-13-1 is given the experimental line designation ND19119.

- Summer 2000 - F₅ Preliminary Yield Trial is grown at two locations in North Dakota on NDSU research land.

- Fall 2000 - Grain of "best" entries, including ND19119, is sent to the USDA-ARS Cereal Crops Research Unit (CCRU), Madison, Wisconsin for malt quality evaluation. Barley and malt quality parameters evaluated include kernel plumpness and weight, barley protein, malt extract, wort protein, wort β -glucan content, malt diastatic power, and α -amylase activity.
- Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
- All entries sent to Madison are screened for net blotch and spot blotch resistance in the greenhouse by the Department of Plant Pathology, NDSU.

- Spring 2001 - Based on favorable agronomic and malt quality data, ND19119 is advanced to the Intermediate Yield Trial.

- Summer 2001 - F₆ Intermediate Yield Trial is grown at six locations in North Dakota on

NDSU research land and at the Montana State University (MSU) Eastern Agricultural Research Center (EARC) in Sidney, Montana.

- A F₆ plant is selected that is true breeding for awn-type and rachilla hair and is labeled ND19119-2.

Fall 2001

- Grain of "best" entries, including ND19119, is sent to the USDA-ARS-CCRU, Madison, Wisconsin for malt quality evaluation.
- Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
- Seed on ND19119-2 is sown in the off-season nursery near Yuma, Arizona for seed increase.

Spring 2002

- Seed of ND19119-2 is harvested from the off-season nursery near Yuma, Arizona.
- Based on favorable agronomic and malt quality data, ND19119 is advanced to the Advanced Yield Trial. Seed of ND19119-2 now replaces seed of ND19119 in yield trials.

Summer 2002

- F₇ Advanced Yield Trial is grown at six locations in North Dakota on NDSU research land and at the MSU EARC in Sidney, Montana.

Fall 2002

- Grain of "best" entries, including ND19119-2 is sent to the USDA-ARS-CCRU, Madison, Wisconsin for malt quality evaluation.
- Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.

Spring 2003

- Based on favorable agronomic and malt quality data, ND19119-2 is advanced to the Varietal Yield Trial.

Summer 2003

- F₈ Varietal Yield trial is grown at six locations in North Dakota on NDSU research land and at the MSU EARC in Sidney, Montana.

Fall 2003

- Grain of "best" entries, including ND19119-2 is sent to the USDA-ARS-CCRU, Madison, Wisconsin for malt quality evaluation.
- Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
- Pilot Scale malting evaluation by the American Malting Barley Association, Inc. (AMBA) is conducted. The malting and brewing industry members of AMBA do pilot scale malting evaluation. Barley and malt quality parameters evaluated are similar to those evaluated by the USDA-ARS-CCRU in Madison, Wisconsin

Spring 2004

- Based on favorable agronomic and malt quality data, continued testing of ND19119-2 in the Varietal Yield Trial is continued. ND19119-2 also is entered in the Mississippi Valley Barley Nursery (MVBN), the Western Dryland Cooperative Nursery (WDCN), and the NDSU Barley Variety

- Trial conducted at the NDSU Research Extension Centers located across the state.
- ND19119-2 is rated as satisfactory in its first year of AMBA Pilot Scale Evaluation.
- Summer 2004
- F₉ Varietal Yield trial is grown at six locations in North Dakota on NDSU research land and at the MSU EARC in Sidney, Montana.
 - The MVBVN and WDCN are grown on over 20 locations in the Midwest and Western U.S.
 - NDSU Barley Trials are grown at seven locations in North Dakota.
- Fall 2004
- Grain of "best" entries, including ND19119-2 is sent to the USDA-ARS-CCRU, Madison, Wisconsin for malt quality evaluation.
 - Selection of entries sent to Madison is based on agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.) and disease data.
 - ND19119-2 is submitted for its second year of Pilot Scale malting evaluation by AMBA.
 - Seed increase of the F₆-derived ND19119-2 begins in preparation of cultivar release in 2006
- Spring 2005
- Based on favorable agronomic and malt quality data, continued testing of ND19119-2 in the Varietal Yield Trial is continued. ND19119-2 also is entered in the Mississippi Valley Barley Nursery (MVBVN), the Western Dryland Cooperative Nursery (WDCN), and the NDSU Barley Variety Trial conducted at the NDSU Research Extension Centers located across the state.
 - ND19119-2 is rated as unsatisfactory in its second year of AMBA Pilot Scale Evaluation due to excessive skinning of the kernel's hull due to poor hull adherence. It is decided to discontinue AMBA testing of ND19119-2 for malting and brewing due to the poor hull adherence.
- Summer 2005
- F₁₀ Varietal Yield trial is grown at six locations in North Dakota on NDSU research land and at the MSU EARC in Sidney, Montana.
 - The MVBVN and WDCN are grown on over 20 locations in the Midwest and Western U.S.
 - NDSU Barley Trials are grown at seven locations in North Dakota.
 - ND19119-2 is released on 1 July 2005 as the named cultivar Rawson.

Rawson was observed for two generations in 2003 and 2004, and was observed to be uniform and stable within commercially acceptable limits for all traits as described in Exhibit C. Rawson was rogued in all generations subsequent to the F₆ plant selection in 2001. One variant was observed. Two-rowed plants 2-6 inches above the canopy occur at a frequency of less than 1/100,000.

A modified pedigree breeding method was used to develop Rawson. In the early generations (i.e., F₂-F₄), highly heritable traits such as maturity, plant height, straw strength, kernel color, and

awn type were selected. Starting at the F₅ generation, selection criteria also included agronomic (i.e., heading date, plant height, straw strength, grain yield, etc.), disease, and malt quality (i.e., grain protein, malt extract, wort protein, kernel plumpness and weight, and enzyme activity. Based on data from multiple locations and years, Rawson was selected for its high yield potential, large kernel size, and high kernel weight.

EXHIBIT B – NOVELTY STATEMENT

200800160

To my knowledge, Rawson most closely resembles Conlon and Pinnacle barley. DNA analysis using polymerase chain reaction (PCR) techniques (Williams et al., 1990) with simple sequence repeat (SSR) markers (Liu et al., 1996) can easily differentiate Rawson from Conlon and Pinnacle barley. Using the Scottish Crop Research Institute (SCRI; Dundee, Scotland) SSR primer pairs Hvm 68 and EBMac 701. Using Hvm 68, a group of bands found at approximately 218 bp in Rawson are absent in the other Conlon and Pinnacle. Using EBMac 701, a band of 137 bp found in Rawson is absent in Conlon and Pinnacle.

Figure 1 presents a scan of a gel showing the critical bands of 218 bp produced by HVM 60 and the 137 bp band produced by EBMac 701 in Rawson, but not Conlon or Pinnacle. The original gel that was scanned is available upon request.

Methods

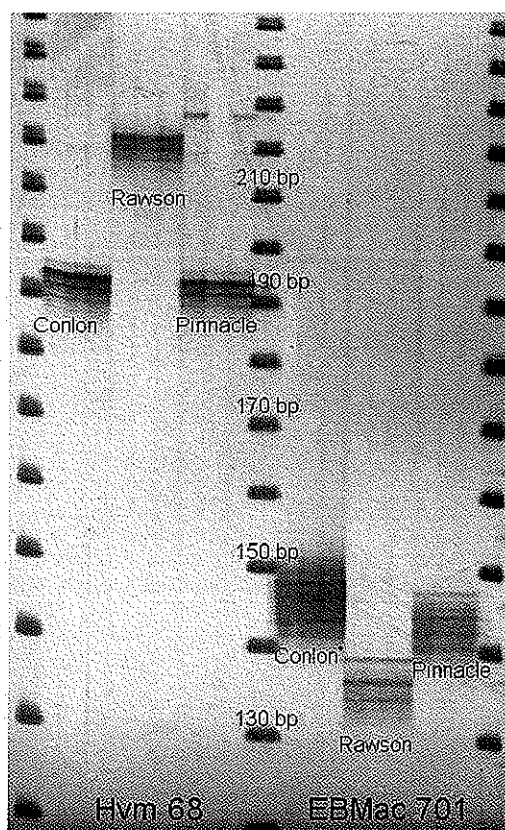
Leaf tissue was collected from all cultivars and stored at -80 °C. DNA was extracted from the leaf tissue using the method of Kleinhofs (personnel communication, 1998). All cultivars were screened for SSR polymorphisms using the method of Ramsay et al. (2000). Reaction conditions were as follows: 1.5 mM MgCl₂; 0.7 mM of each dATP, dCTP, dGTP, and dTTP; 0.26 µM of forward and reverse primers; 15-25 ng of genomic DNA; 0.6 µL/reaction of Taq DNA polymerase; and 0.9 units of Taq buffer. The reaction volume was 12 µL. Amplification reactions were done with a Techne model FTG05TP (Cambridge, England) thermocycler using a protocol that consists of 94 °C for 15 sec, 60 °C for 15 sec, and 72 °C for 30 sec for 35 cycles; with a final hold at 25 °C. Reactions were held at 4 °C until separated in a denaturing polyacrylamide gel by electrophoresis. Bands were visualized by staining with Promega Silver Sequence™ DNA Sequencing System (Promega; Madison, WI). The gel was scanned then transferred to filter paper for a permanent record.

Literature Cited

- Liu, Z., -W, R.M. Biyashev, and M.A. Saghai Maroof. 1996. Development of simple sequence repeat DNA markers and their integration into a barley linkage map. TAG 93:869-876.
- Ramsay, L., M. Macaulay, S. degli Ivanissevich, K. MacLean, L. Cardle, J. Fuller, K.J. Edwards, S. Tuveesson, M. Morgante, A. Massari, E. Maestri, N. Marmiroli, T. Sjakaste, M. Ganai, W. Powell, and R. Waug. 2000. A simple sequence repeat-based linkage map of barley. Genetics 156:1997-2005.
- Williams, J.G.K., A.R. Kubelik, K.J. Livak, J.A. Rafalski, and S.V. Tingey. 1990. DNA polymorphisms amplified by arbitrary primers are useful as genetic markers. Nucleic Acids Res. 18:6531-6535.

200800160

Figure 1. Denaturing polyacrylamide gel showing a 218 bp and 137 bp simple sequence (SSR) polymorphisms using Scottish Crop Research Institute primer pairs HVM 68 and EBMac 701, respectively, that distinguishes Rawson barley from Conlon and Pinnacle barley. Bands are present in Rawson but not Conlon and Pinnacle. Lane marker ladder is a 10 bp ladder.



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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

OBJECTIVE DESCRIPTION OF VARIETY
Barley (*Hordeum vulgare* L.)

NAME OF APPLICANT (S) NDSU Research Foundation	TEMPORARY OR EXPERIMENTAL DESIGNATION ND19119-2	VARIETY NAME Ransom
ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country) C/O Executive Director 1735 NDSU Research Park PO Box 5002 Fargo, ND 58105-5002		FOR OFFICIAL USE ONLY PVPO NUMBER #200800160

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (i.e. or) when the number is either 99 or less or 9 or less.

1. GROWTH HABIT:

1 = Spring 2 = Facultative Winter 3 = Winter Early Growth: 1 = Prostrate 2 = Semi-Prostrate 3 = Erect

2. MATURITY: (50% Flowering)

1 = Early (California Mariout) 2 = Mid-Season (Betzes) 3 = Late (Frontier)
 No. Days Earlier Than _____ *
 Same as Check _____ *
 No. of Days Later Than Conlon *

3. PLANT: (From Soil Level to Top of Head)

1 = Semi-Dwarf 2 = Short (California Mariout) 3 = Medium Tall (Betzes) 4 = Tall (Conquest)
 cm Shorter Than _____ *
 Same as Check _____ *
 cm Taller Than Conlon *

4. STEM:

Exsertion (Flag to Spike at Maturity): 1 = (0 - 3 cm) 2 = (3 - 10 cm) 3 = (10 - 15 cm)
 Anthocyanin: 1 = Absent 2 = Present
 No. of Nodes (Originating from Node Above Ground)
 Collar Shape: 1 = Closed 2 = V-Shaped 3 = Open 4 = Modified Closed or Open
 Shape of Neck: 1 = Straight 2 = Snaky 3 = Other (Specify) _____

* A commercial variety grown in the same trial.

5. LEAF:

- 1 Basal Leaf Sheath (Seedling): 1 = Glabrous 2 = Pubescent
- 1 Position of Flag Leaf (At Boot Stage): 1 = Drooping 2 = Upright
- 2 Waxiness: 1 = Absent (Glossy) 2 = Slightly Waxy 3 = Waxy
- 08 mm Width (First Leaf Below Flag Leaf)
- 28 cm Length (First Leaf Below Flag Leaf)
- 1 Anthocyanin in Leaf Sheath: 1 = Absent 2 = Present

6. HEAD:

- 1 Type: 1 = Two-Rowed 2 = Six-Rowed
- 2 Density: 1 = Lax 2 = Erect (Not Dense) 3 = Erect (Dense) 4 = Other (Specify) _____
- 2 Shape: 1 = Tapering 2 = Strap 3 = Clavate 4 = Other (Specify) _____
- 2 Waxiness 1 = Absent (Glossy) 2 = Slightly Waxy 3 = Waxy
- 1 Lateral Kernels Overlap: 1 = None 2 = At Tip 3 = 1/4 - 1/2 of Head
- 3 Rachis (Hair on Edge): 1 = Lacking 2 = Few 3 = Covered

7. GLUME:

- 2 Length: 1 = 1/3 of Lemma 2 = 1/2 of Lemma 3 = More than 1/2 of Lemma
- 3 Hairs: 1 = None 2 = Short 3 = Long
- 2 Hair Covering: 1 = None 2 = Restricted to Middle 3 = Confined to Band 4 = Completely Covered
- 2 Awns: 1 = Less than Equal to Length of Glumes 2 = Equal to Length of Glumes 3 = More than Equal to Length of Glumes
- 3 Awn Surface: 1 = Smooth 2 = Semi-Smooth 3 = Rough

8. LEMMA:

- 5 Awn: 1 = Awnless
2 = Awnlets on Central Rows, Awnless on Lateral Rows
3 = Short on Central Rows, Awnlets on Lateral Rows
4 = Short (Less than Equal to Length of Spike)
5 = Long (Longer than Spike)
6 = Hooded
- 3 Awn Surface: 1 = Awnless 2 = Smooth 3 = Semi-Smooth 4 = Rough
- 2 Teeth: 1 = Absent 2 = Few 3 = Numerous
- 1 Hair: 1 = Absent 2 = Present
- 3 Shape of Base: 1 = Depression 2 = Slight Crease 3 = Transverse Crease
- 2 Rachilla Hairs: 1 = Short 2 = Long

9. STIGMA:

- 2 Hairs: 1 = Few 2 = Many

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE**EXHIBIT E**
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) NDSU Research Foundation	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER ND19119-2	3. VARIETY NAME 'Rawson'
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) C/O Executive Director PO Box 5002 1735 NDSU Research Park Drive Fargo, ND 58105-5002	5. TELEPHONE (Include area code) (701) 231-8931	6. FAX (Include area code) (701) 231-6661
7. PVPO NUMBER #200800160		

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain. ☒ YES ☐ NO9. Is the applicant (individual or company) a U.S. national or a U.S. based company? If no, give name of country. ☒ YES ☐ NO10. Is the applicant the original owner? ☐ YES ☒ NO If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☒ YES ☐ NO If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☐ YES ☐ NO If no, give name of country

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

Dr. Jerome Franckowiak, an employee of the North Dakota Agricultural Experiment Station (NDAES) and North Dakota State University (NDSU), is a plant breeder who developed 'RAWSON', the two-rowed spring barley cultivar for which Plant Variety Protection is hereby sought. The employee by agreement and because of condition of the use of the facilities and funds of the NDAES and NDSU has assigned all ownership rights to 'RAWSON' barley to the NDAES and NDSU.

North Dakota State University on behalf of the NDAES has assigned all ownership to the NDSU Research Foundation. The NDSU Research Foundation is a nonprofit corporation set up to own and manage the intellectual property of NDSU.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

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EXHIBIT F
DECLARATION REGARDING DEPOSIT

NAME OF OWNER (S) NDSU Research Foundation	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) c/o Executive Director 1735 NDSU Research Park Dr.; PO Box 5002 Fargo, ND 58102-5002	TEMPORARY OR EXPERIMENTAL DESIGNATION ND19119-2 VARIETY NAME 'Rawson'
NAME OF OWNER REPRESENTATIVE (S) Richard D. Horsley and Dale Zetocha	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) c/o Executive Director 1735 NDSU Research Park Dr.; PO Box 5002 Fargo, ND 58102-5002	FOR OFFICIAL USE ONLY PVPO NUMBER #200800160

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.

Dale Zetocha, Ex. Dir.
Signature

3/10/08
Date

Richard D. Horsley
Richard Horsley

3/10/08
Date